EPA Region 7 TMDL Review

TMDL ID: KS-MO-07-234-3 **State:** KS
Document Name: SOUTH FORK BIG NEMAHA RIVER

Basin(s): MISSOURI RIVER BASIN
HUC(s): 10240007
Water body(ies): SOUTH FORK BIG NEMAHA RIVER
Tributary(ies): BUGER CREEK (24), DEER CREEK (18), FISHER CREEK (28), HARRIS CREEK (166), ILLINOIS CREEK (30), MANLEY CREEK (14), TENNESSEE CREEK (29), TURKEY CREEK (4), TURKEY CREEK (5), WILDCAT CREEK (22), WILDCAT CREEK (23), WOLF CREEK (12), WOLF CREEK (13), WOLF PEN CREEK (25)
Pollutant(s): BIOLOGY, SUSPENDED SOLIDS

Submittal Date: 9/5/2007 **Approved:** Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

Kansas Department of Health and Environment (KDHE) officially submitted this TMDL for approval in a letter received by United States Environmental Protection Agency (EPA) on September 5, 2007. Revisions to South Fork Big Nemaha River TMDL were received by email October 26, 2007.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

Biological criteria for Kansas streams are based on the following multi-metric indices: Macroinvertebrate Biotic Index (MBI), Kansas Biotic Index (KBI), ephemeroptera, plecoptera, trichoptera (EPT) index and %EPT abundance. The submittal targets are set to result in the attainment of these indices. South Fork Big Nemaha River LC is set by the use of the load duration curve based on the total suspended solids (TSS) concentrations measured at various percentiles of flow in a paired reference stream to address the suspended solids narrative standard.

The TSS target is used because EPT groups like to utilize coarse substrates as habitats in the stream. Excess amount of TSS load that deposits on the substrates imposes a great physical threat to their living conditions. At median flow, 50th percentile of flow exceedance, the LC is approximately 3.87 tons/day of TSS.

EPA agrees that meeting the LC will result in the attainment of WQS.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the

target is included in the submittal.

Water Quality Standard: Suspended Solids - Narrative: Suspended solids added to surface waters by artificial sources shall not interfere with the behavior, reproduction, physical habitat or other factor related to the survival and propagation of aquatic or semi-aquatic or terrestrial wildlife. (KAR 28-16-28e(c)((2)(B)). The WQS is a narrative, and the numeric biological indice targets are indirectly related to a numeric translation of the narrative standard.

Designated uses for South Fork Big Nemaha River main segments (3, 15, 16) are: Primary Contact Recreation "C" on main stem segment 15 and secondary Contact Recreation on the remaining main stem segments (3 and 16) and tributaries. Other designated uses for main stem segments include Expected Aquatic Life Support and Domestic Water Supply, Food Procurement, Ground Water Recharge, Industrial Water Supply and Livestock Watering.

The impaired use is Expected Aquatic Life on the main stem segments.

The submittal uses the narrative suspended solids standard to address the biological indices used to determine whether the water body is meeting the aquatic life use. The numeric expression of the narrative standard was derived using a paired watershed approach. The target is the current load duration curve of the reference streams.

The desired endpoint is to achieve an average composite value of 1.49 or less, based on KBI, MBI and EPT over 2008-2012. Achievement of this endpoint would be indicative of full support of the aquatic life use in the stream reach.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

The State of Kansas does not have a numeric criterion for TSS in their WQS.

The linkage of the targeted pollutants to the biological impairment is established. To develop this linkage the submittal uses the TSS load for a similar river meeting its aquatic life designated use as a reference. The Chikaskia River is the stream chosen as a reference and its current load duration curve is the target for the South Fork Big Nemaha River TMDL. The submittal recognizes that the relationship between biotic indices and TSS is not yet quantified and so the reference approach is used.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

There are six National Pollution Discharge Elimination System (NPDES) permitted municipal wastewater plants within the watershed, and two of them are located in Nemaha County, KS (Oneida KS0093467 and Seneca KS0047538). There are four NPDES permitted facilities located in Nebraska that have been identified in this TMDL.

There are 97 confined animal feeding operations (CAFO) sites. They are listed in Appendix A of the submittal. One of these facilities, a swine operation (9,650 head), is of sufficient size to warrant NPDES permitting (KS0090191). The estimated number of cattle in the watershed is 53,383, 75% of which are located in Nemaha County, KS. All of the livestock operations are non-discharging.

Land use in the watershed is predominantly cultivated (49%), forest (3%), grassland (23%), pasture (24%) and

cropland (38%). Most of the riparian area in the watershed is categorized as cropland (38%), while grassland, pasture and forest account for about 17%, 27% and 17% respectively. Other land uses, such as urban and industrial, account for less than 1% each.

There are an estimated 1,096 septic tank systems in the watershed. These systems are likely to impact South Fork Big Nemaha River during low flow events.

The areas of the watershed have an average soil permeability of 0.4 inches/hour. This TMDL describes rainfall conditions which generate runoff events and the magnitude of those events.

Most of the background levels of TSS and associated organics come from natural sheet and rill erosions from overland runoff. Stream bank and bed erosions may be another important source during high flow events.

EPA agrees that the submittal has identified all significant sources in the watershed.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2 (i)]. If this is a phase II TMDL the change in LC will be documented in this section.

There is an indirect, yet un-quantified relationship between sediment loading and biological integrity. Decreased sediment loads, indicative of improved water quality, should result in better aquatic communities. The ability of biological data to integrate the various physical and chemical impacts of the entire watershed on the aquatic community defies allocation of specific suspended solid loads between point and nonpoint sources.

The biological integrity is a function of multiple factors, the initial pollution load reduction responsibility will be to decrease the average condition of sediment over the range of flows encountered on the South Fork Big Nemaha River. The desired TSS concentrations should be set towards the TSS levels observed across the seasons at Chikaskia River to improve stream habitat conditions for macroinvertebrate communities. For the interim, TSS levels should be at concentrations associated with full support composite biological index values.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

The WLA is set at current conditions for the two discharging facilities in the watershed (Table 4 within the TMDL), all with permits limits for TSS. The monthly permit limits for the two waste water treatment plant (WWTPs) are both set at 80 mg/L for:

Oneida M-MO15-OO01 0.003 tons/day
Seneca M-MO19-OO01 0.167 tons/day

There are 97 CAFO sites. They are listed in Appendix A of the submittal. One of these facilities, a swine operation (9,650 head, Nemaha CO), is of sufficient size to warrant NPDES permitting (KS0090191), but the WLA is zero.

The WLA is demarcated by the area under the load duration curve bounded from 99% to 100%, corresponding to a 7Q10 low flow. All non-discharging CAFO facilities have a WLA of zero.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

The LA is defined as loads occurring at all flows. Table six (South Fork Big Nemaha @ site SC234), seven

(Turkey Creek) and eight (South Fork Big Nemaha @ site SC682), in the TMDL, outlines the LA at each percent flow exceedance, an example, at the 50th percentile of flow at SC234 is 3.7 tons/day, Turkey Creek 2.0 tons/day and SC682 0.08 tons/day.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

The MOS is implicit. The desired endpoint is to achieve an average composite value of 1.49 or less, based on KBI, MBI and EPT. The calculation and use of multiple biological metrics provides a MOS that aquatic life support has been fully attained, and the designated use has been restored.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

Sampling occurs during open water season (April to November) within the aquatic stage of the life cycle of the macroinvertebrates. Seasonal variation and critical conditions are accounted for by the use of a load duration curve. The curve applies over all flows, across all seasons and periods of critical flow.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

Public Meetings: Public meetings to discuss TMDLs in the Missouri Basin have been held since 2001. KDHE maintains a web site where all TMDLs, both draft and approved, are available to the public and these dates were June 2007 to August 2007.

Public Hearing: A public hearing on these Missouri Basin TMDLs was held in Hiawatha on May 30, 2007.

Basin Advisory Committee: The Missouri Basin Advisory Committee met to discuss these TMDLs on June 26, 2007 in Atchison, December 1, 2006 and January 26, 2007 in Highland, March 16, 2007 in Atchison and will meet to discuss these TMDLs on May 14, 2007 in Hiawatha.

Comments and KDHE responses to the comments were submitted to EPA with this package dated September 5, 2007.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

KDHE will continue to collect seasonal biological samples from South Fork Big Nemaha River for three years over 2008-2012. Periodic monitoring of sediment or solid content of wastewater discharged from treatment systems will be expected in reissued NPDES permits.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

Reasonable assurance is not required for this TMDL because permitted facilities WLA are sufficient. Though not required the submittal does identify state authorities and funding sources for implementing the TMDL.